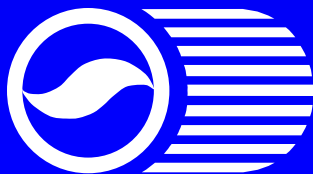


Air Pollution Effects on Health

Barbara L. Weller, Ph.D.

California Air Resources Board



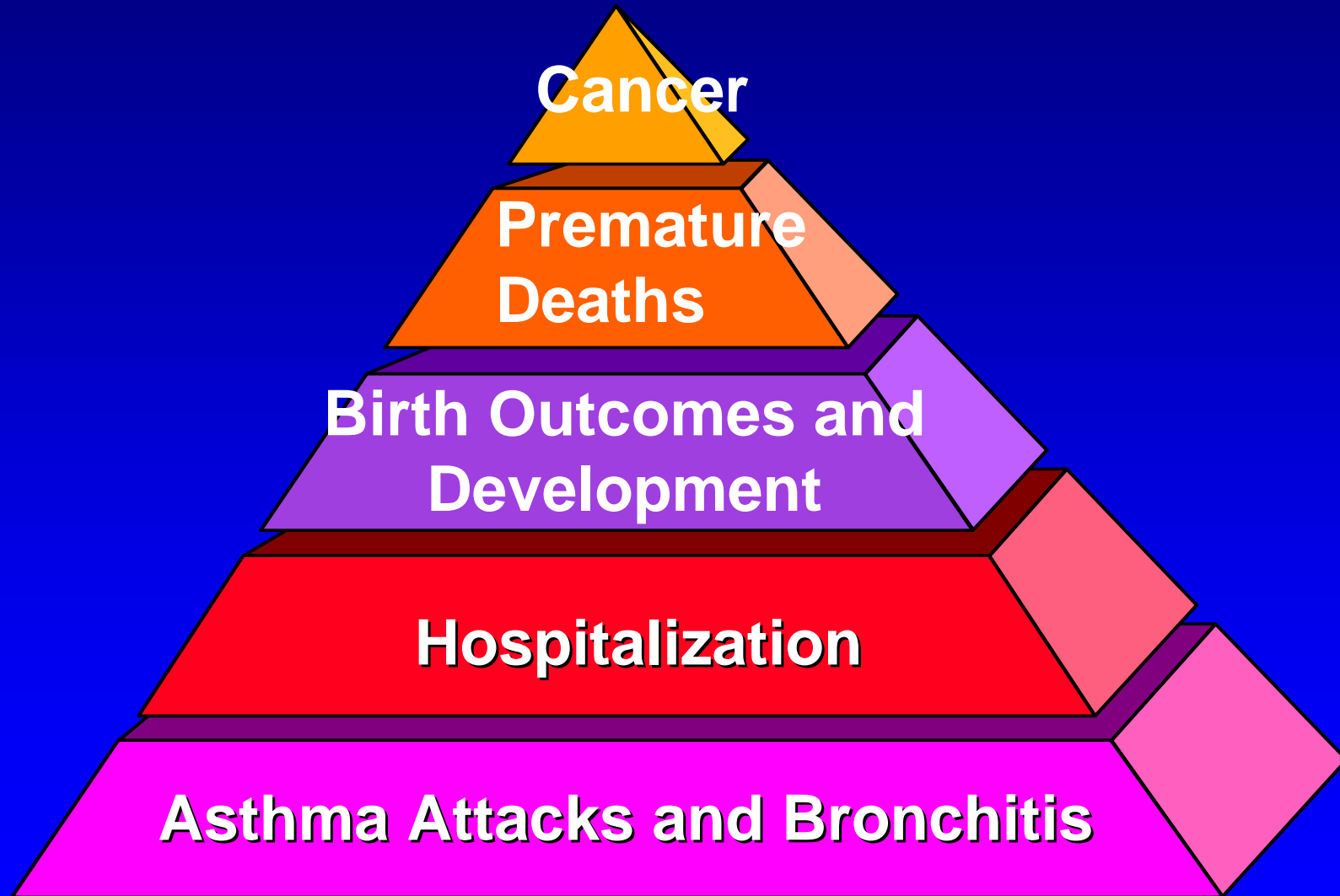
California Environmental Protection Agency

Air Resources Board

Pollutants of Concern

- **Particulate Matter**
- **Toxic Air Contaminants**
- **Ozone**
- **Nitrogen Dioxide**
- **Carbon Monoxide**

Health Impacts of Air Pollution



Cancer

- Increased risk of lung cancer and other forms of cancer
- 380 potential cases per year

Pollutants: toxics such as diesel particles, asbestos, chromium VI, benzene, formaldehyde

Premature Deaths

- Mostly in elderly patients with heart/lung disease
- Up to 6,500 deaths per year in California
- ~14 year reduction in life span
- Children are also affected

Pollutants: particles

Hospitalization

- **Respiratory causes: 4,080 admissions**
- **Cardiovascular disease: 3,390 admissions**

Pollutants: ozone, particles

Birth Outcomes and Development

- **Birth outcomes**
- **Low birth weight**
- **Impaired cognitive ability in children from exposure to certain toxics**
- **Slowed lung function growth in children**

Pollutants: lead, chromium VI, particles, NOx, acids

Asthma and Bronchitis

- **Worsens asthma**
 - Up to 340,000 attacks per year
 - More frequent attacks
 - More severe attacks
- **Bronchitis in asthmatics**
- **Increased school and work absences**
 - Up to 2,800,000 lost work days per year

Pollutants: ozone, particles

Other Air Pollution Impacts

- **Decreases visibility**
- **Damages forests and ecosystems**
- **Reduces crop yield**
- **Contributes to global climate change**

Who Is *Most* Sensitive to Diesel Air Pollution?

- Children
- Elderly People
- People with Asthma
- Chronic Heart Disease Patients
- People with Bronchitis
- Athletes



Children and Air Pollution

- Children are sensitive to air pollution
- Little is known about air pollution effects on children
- Long-term studies are needed to determine chronic effects



Childhood Asthma

- A complex issue
- On the rise
- Air pollution
 - Worsens existing asthma
 - May play a role in new cases
- A focus of ARB research efforts



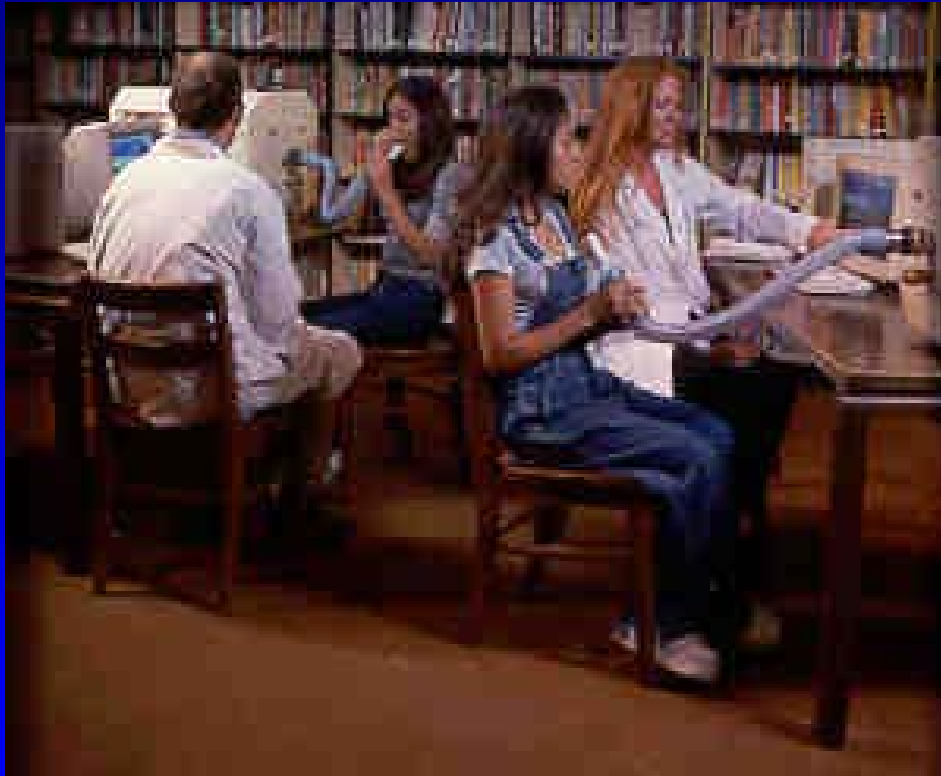
Summary Air Pollution Impacts

- **Air pollution causes serious health effects**
- **Everyone is affected by air pollution at some point in their lifetime**
- **Major impacts on California communities**

Identifying Air Pollution's Health Impact

- **Air Pollution Health Research**
- **Air Quality Standards**

Southern California Children's Health Study



- O_3 increases school absences
- PM_{10} increases bronchitis in asthmatics



Recent Results

- ↑ Acid vapor, NO₂, PM2.5 exposure associated with ↓ in lung function growth rate
- ↑ O₃ associated with ↓ growth in peak flow rate
- ↑ risk of developing asthma in high O₃ communities in children that play 3 or more team sports

Fresno Asthmatic Children's Environment Study

- 300 asthmatic children
- Study of the effect of environmental factors including air pollution, on daily asthma symptoms and long term asthma progression.



Ambient Air Quality Standards

- **Children's Environmental Health Protection Act**
- **Priorities**
 - **Particulate Matter**
 - **Ozone**
 - **Nitrogen Dioxide**



Annual Average Standards for Particulate Matter

Organization	PM measure	Concentration ($\mu\text{g}/\text{m}^3$)	Attainment Date
U.S.EPA	PM10	50	
European Union	PM10	40	1/1/05
European Union	PM10	20	1/1/10
California	PM10	20	
U.S. EPA	PM2.5	15 (12.5 – 20)	
California	PM2.5	12	

Toxic Air Contaminant Program

- Formal identification of toxic air contaminants
- Develop control measures



75% Reduction in Diesel PM by 2010

(On- and Off-road Vehicles, Stationary Engines)

- New vehicle and engine standards
- Retrofits where technically feasible and cost-effective
- International Advisory Committee
- Low-sulfur (15 ppmw) diesel fuel
- Enforcement programs



www.arb.ca.gov/diesel/diesellrrp.htm

Community Health Programs



- **Children's Environmental Health Protection**
- **Neighborhood Assessment**
- **Environmental Justice**

Thank you

